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Asthma management and morbidity in Australian general practice: the relationship between patient and doctor estimates

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The aims of this study were to describe asthma management and morbidity in patients attending general practitioners in Australia, and to assess the relationship between patient reports and those of their general practitioner (GP). The sample comprised consecutive patients attending 46 general practitioners chosen at random in five regions of New South Wales, Australia. A total of 4538 patients were screened, 607 (13·4%) reported ever having diagnosed asthma, and the 501 who reported asthma in the previous 12 months completed a detailed questionnaire. Three hundred and thirty-four patients also had information about their asthma management recorded by their GP. The patient questionnaire asked about asthma symptoms, therapy, lung function measurement, and asthma-related morbidity. The GP questionnaire asked the doctor to record similar information about the patients.

Two-thirds of the patients used regular inhaled β_2-agonist medication, and one-half reported using preventive therapy. Only 24% owned a peak flow meter and 9% had a written plan of action for asthma attacks. Although preventive therapy and airway function assessment were more common in those with frequent symptoms (>2–3 times per week), this group were still sub-optimally managed. In the matched sample (n=334), doctors reported prescribing bronchodilator and preventive medication, measuring airway function and recommending peak flow meter use more often than suggested by patient-reported data. The study concludes that many patients do not attend for regular review, and that management remains sub-optimal, particularly in young adults. Data from patient surveys may underestimate clinical practice, as assessed from doctors' records. This should lead to patient-derived estimates of management being interpreted with caution in epidemiological studies. Further attention to patient understanding and compliance with prescribed asthma management advice is needed in order to better manage asthma in the community.

Introduction

Asthma is an important public health concern in Australia, affecting 20% of children and 8% of adults at any given time (1). The prevalence, mortality and morbidity from asthma are higher in Australia and New Zealand than in the U.K. or other European countries, in spite of similar consensus approaches to therapy (2,3), comparable smoking prevalence rates and similar health care systems. On account of its prevalence, asthma presents first in general practice, and is typically managed in that setting (4). Asthma was amongst the leading causes of chronic illness in the 1990 National Health Survey (5), and was treated at 3·7% of patient encounters in the recent Australian general practice morbidity survey (6).

Many epidemiological studies, using patient-reported data, have demonstrated that asthma remains sub-optimally treated in population and general practice settings (7–9). Major problems with management appear to include an over-reliance on β_2-agonist bronchodilators, and under-utilization of inhaled steroids and other preventive medication. In addition, few patients measure and monitor their asthma with a peak flow meter, or use written action plans to guide their actions when asthma symptoms or PEF rates worsen.

Some U.K. studies have suggested that there has been a recent improvement in asthma management in general practice (10), with an increase in the use of

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preventive therapy (inhaled corticosteroids or cromoglycate) and in the frequency of airway function measurement by both doctors and patients. Other studies have shown such improvements following specific interventions in the setting of general practice (11,12), although this is not a consistent finding (13,14).

The first objective of this study was to assess asthma management received by a random sample of patients attending general practitioners in New South Wales, Australia. Comparisons with published guidelines for optimal management were sought, specifically the need for preventive therapy, regular doctor and patient monitoring of severity, and regular medical review (2). The second objective was to determine the extent to which asthma management reported by patients was the same as that recorded by their general practitioner.

Methods

The study was undertaken between August and December 1991. General practitioners (GPs) were selected at random from the Medicare list in three urban Sydney regions of different socio-economic status and an inland and coastal rural town in New South Wales. General practitioners were defined as practitioners providing at least 1500 GP services under Medicare in the previous year. A sample of 140 eligible practitioners were approached, and 52 agreed to participate. Of these, 46 finally contributed data to the study. The practitioners who participated were slightly younger than those who did not, but did not differ by gender or type of practice. At least nine practices were recruited from each area.

The target population comprised any adult or child attending the practice for any reason who reported even having had asthma. Each receptionist used a standard written question to screen 100 consecutive patients attending the practitioner. Eligible patients reported asthma symptoms or treatment within the previous 12 months, and were asked to complete an asthma questionnaire, and to give an asthma questionnaire to their doctor at the time of their consultation.

The patient questionnaire consisted of IUAT-validated asthma symptom questions (15), as well as asthma management and morbidity questions derived from a recent population-based Australian survey (1). Questions asked about currently used therapy, the use of peak flow meters and asthma action plans, office lung function assessments, and recent hospital and GP attendances for asthma. Parents completed questionnaires on behalf of children aged less than 12 years.

The GPs questionnaire was completed at or after the consultation, using the patient's medical record. General practitioners were asked about the patient's current prescribed therapy and management, and recent utilization of the practice and other health services. Doctors were only asked to complete surveys for the subset of patients who had been treated for asthma at the practice surveys for the subset of patients who had been treated for asthma at the practice during the preceding 12 months.

Epidemiological surveys often describe the prevalence of asthma management practices using patient self-report. In this study, GP perceptions were chosen as the 'gold standard' as they had access to medical records of patient management, and the patients' perceptions compared to them. Overall agreement was assessed using the kappa statistic, which adjusts crude percent agreement for chance (16). In addition, the sensitivity (Se) and specificity (Sp) of patient responses compared to their doctors' were calculated. These demonstrated where misclassification in the estimates of asthma management occurred. Sensitivity was the proportion of doctor-defined positive statements [such as prescribed inhaled corticosteroid (ICS) medication] which were reported by the patient. Specificity was the proportion of all negative doctor responses for each characteristic that were also patient negative. The positive predictive value (+PV) here was the proportion of patients with positive report of therapy or management who have a positive finding reported by their doctor. It is more clinically useful than the test characteristic measures (Se and Sp), but it does vary according to the prevalence of the problem (17).

The study used a cross-sectional analytic design, with proportions presented for each category of asthma management of interest. Analyses were undertaken for those with any asthma symptom reported 2–3 times per week or more often over the previous year (the 'frequent symptoms' group). Management practices and morbidity were compared between those with and those without frequent symptoms. Differences between proportions, and their 99% confidence intervals were reported, rather than 95% CI, to adjust for multiple testing (18).

Results

Participation in the study is shown in Fig. 1. Rates of participation, GP form completion and asthma prevalence did not differ significantly among the five geographical areas. The 4538 screened patients represented 94% of all patients (n=4829) who attended these practices during the screening periods. Of these

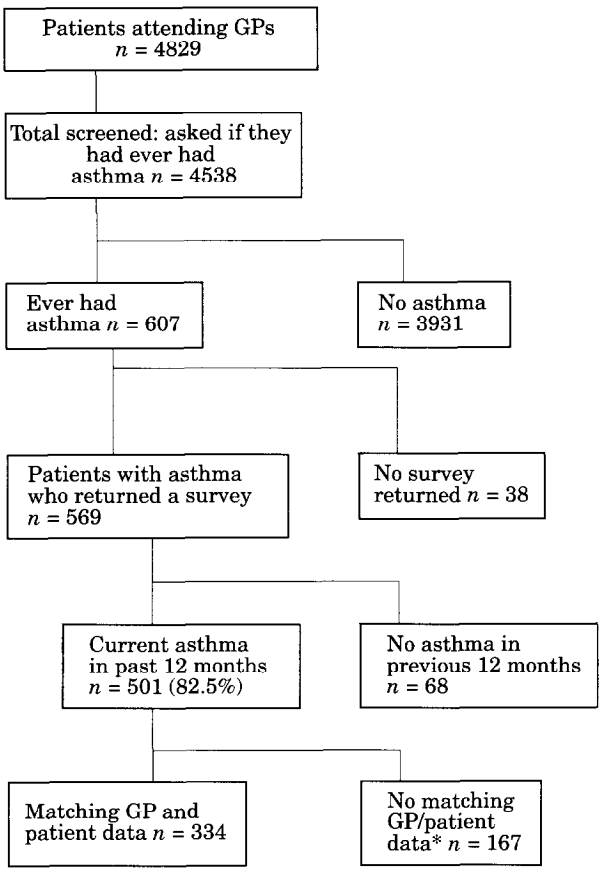

Fig. 1 Participation in the asthma survey by patients and doctors.

4538 patients, 13·4% (95% CI 12·4 ± 14·4%) reported that they had had asthma diagnosed by a doctor in the past.

The sample of 501 patients with current asthma, defined as symptoms or asthma treatment (in the previous 12 months) was used in analysis. More responders were female (58%), with males predominating only in the 0–14 years age group. These were similar numbers across age groups, with 149 aged less than 15 years, 149 aged 15–44 years, and 197 aged over 45 years, some of whom had a mixed pattern of illness, reporting both asthma and other chronic respiratory and cardiac diseases.

Although by definition, all patients reported that they had experienced some asthma symptoms or had used asthma medications in the previous year, only 76·6% had seen a doctor for their asthma. Regular use of inhaled β_2-agonists was reported by two-thirds of patients and preventive medication reported by one-half of the sample. Theophylline and regular oral steroids were used by only a minority of patients, most commonly in those aged over 45 years. Self-reported compliance was investigated, with 64·5% reporting that they took all or almost all of their regular preventive medication as prescribed.

Only 15·6% of patients regularly used a peak flow meter to monitor their asthma, and although 52% had a verbal action plan, only 8·7% had a written one. Only one-third of patients reported that they usually had their lung function assessed when they went to their doctor, and this did not vary by age.

Health care utilization in the past year was assessed, with 11·5% having visited a hospital emergency department (ED), 20% having an emergency GP visit in the previous 12 months, and 10·9% having been admitted to hospital for their asthma. Emergency GP and hospital ED visits were more common among children. Fewer than one-half of the sample had ever been to a specialist physician or paediatrician for their asthma, and only 13% had been within the past year, more frequently among children.

Table 1 Therapy, self-management and morbidity: comparison of those with frequent asthma symptoms and those with infrequent asthma

Characteristic	Frequent symptoms (n=215) (%)	Infrequent asthma (n=286) (%)	Difference in proportions (± 99% CI)
Patient is current smoker*	21·6	17·5	4·1 (− 10·0–18·2)
Asthma medication			
Use daily asthma medication	83·5	44·6	38·9 (28·9–48·9)†
Regular inhaled β_2-agonist bronchodilator	82·3	57·7	24·6 (14·6–34·7)†
Regular preventive medication (inhaled steroids or cromoglycate)	62·3	40·6	21·7 (10·4–33·0)†
Regular theophylline use	20·9	7·3	13·6 (5·4–21·7)†
Regular oral steroid use	10·7	3·8	6·9 (0·6–13·0)†
Asthma monitoring, medical care			
Own a peak flow meter (PFM)	29·5	20·0	9·5 (− 0·6–19·4)
Used PFM (weekly or >once/week)	20·9	11·2	9·7 (1·1–18·3)†
Lung function measured in doctor's surgery (always/sometimes)	42·8	24·5	18·3 (7·4–29·1)†
Have a written asthma action plan	8·4	8·7	0·3 (− 6·8–6·1)
Had inhaler technique checked in past 12 months	62·3	45·1	17·2 (5·8–28·6)†
Health care utilization and morbidity			
Any Accident and Emergency visit previous 12 months	17·7	6·6	11·1 (3·3–18·7)†
Emergency GP visit in the previous 12 months	21·4	18·5	2·9 (− 0·6–12·2)
Asthma hospital admission in the previous 12 months	15·8	7·0	8·8 (1·3–16·3)†
Routine GP visit for asthma in the past 3 months	59·1	38·1	21·0 (9·6–32·3)†
Visited a specialist for their asthma in past 12 months	16·7	10·5	6·2 (− 1·7–14·3)
Absence from school or work for at least 1 week in the past 12 months	19·5	22·0	2·5 (− 11·9–6·9)

*Analysis confined to adults (≥15 years); †P<0·01.

Of those 293 who reported that they were at work or school, 48% reported time off because of asthma in the previous year, 36% reporting 1–7 days off, and 12% reporting losing more than 7 days. In children aged less than 14 years, three-quarters reported some school absence, and over one-fifth reported more than a week off school.

Table 1 shows the prevalence of asthma management practices in the 215 patients (43%) with more frequent symptoms (at least 2–3 times per week). Frequent symptoms were reported by 26% of those aged less than 14 years, 46% of those aged 15–44 years, and 55% of those older than 45 years. One-fifth of adults with frequent symptoms reported that they smoked, which was slightly but not significantly more than those with less frequent symptoms.

A greater proportion of those with frequent symptoms used inhaled β_2-agonists and regular preventive medication compared to those with less frequent symptoms. However, the rates of preventive medication use were still low, reported by only two-thirds of those with frequent symptoms. Overall, peak flow meter ownership and having a written asthma action plan did not differ by symptom frequency, but office lung function assessment was more likely in the symptomatic group.

Emergency department visits, hospital admissions, specialist doctor visits and GP visits in the previous 12 months were significantly more common in those with frequent symptoms. Absences from school or work were no more likely in the more symptomatic group (Table 1).

The relationship between patient- and doctor-reported asthma management is shown in Table 2, and was derived from a sub-sample of the 501 responders. This matched group of 334 respondents was comprised of patients who had been to their GP for asthma in the previous 12 months, and for whom medical record information was available. The matched sample (n=334) was under-represented in the 15–44 years age group (24·8% compared to 30·1% overall), and were more likely than the remaining 167 patients to report weekly wheeze symptoms (38·5% compared with 28·3%; P<0·01), take daily asthma medication (68·8% compared with 47·5%; P<0·01), and to have been admitted to

Table 2 Matched analysis (matched sample $n=334$) comparing patients' report with general practitioners' perceptions

Parameter	GP perception (%)	Patient perception (%)	Kappa (±95% CI)	Sensitivity (Se)	Specificity (Sp)	Positive predictive value (+PV)
Patient is a current smoker	12·0	11·6	0·75 (0·64–0·86)	0·89	0·98	0·77
Patient using regular inhaled bronchodilator	91·0	71·2	0·48 (0·34–0·63)	0·75	0·70	0·96
Patient using regular preventive therapy	71·0	55·6	0·61 (0·52–0·69)	0·76	0·94	0·97
Patient using regular theophylline medication	17·4	16·7	0·71 (0·61–0·81)	0·74	0·95	0·77
Patient using regular oral steroids	11·4	9·0	0·67 (0·54–0·81)	0·63	0·98	0·80
Regular peak flow meter user	35·1	14·9	0·25 (0·17–0·33)	0·34	0·93	0·41
Have written action plan	13·8	10·5	0·42 (0·28–0·57)	0·43	0·95	0·44
three or more GP visits in past 3 months	18·8	20·5	0·40 (0·30–0·50)	0·87	0·64	0·74
Admitted to hospital for asthma in past year	14·1	14·1	0·71 (0·60–0·81)	0·84	0·97	0·67
Have seen specialist for asthma (in past year)	19·1	17·5	0·70 (0·50–0·73)	0·67	0·94	0·64

hospital for asthma in the previous year (13·8%, 6·8%; $P<0·001$).

There was good agreement regarding smoking status, with little misclassification between doctors' and patients' reports (Table 2). Doctors reported higher rates of prescribing β_2-agonist and preventive medication than was reported by patients. For example, doctors reported that 91% of patients were prescribed bronchodilators, when only 71% of patients reported using them; similarly, doctors prescribed preventive medication for 71%, but only 55·6% of patients reported regular use. Misclassification occurred as follows: 75 of the 304 patients whom the doctors reported as having been prescribed inhaled β_2-agonists were not actually using them (Se=0·75). Conversely, nine of the 30 patients whom the doctors thought were not using inhaled β_2-agonists were actually doing so (Sp=0·70). Nonetheless, given the high rates of usage of these medications, positive predictive values were higher than for the less prevalent theophylline and oral corticosteroid use, although measures of agreement between doctor and patient were better for these latter two medication groups.

Compared to GP reporting, patients underestimated their use of written action plans. Here, doctors identified 46 patients who had received an action plan, but only 20 of those patients reported that they had one (Se=0·43). Doctors reported that 35% of patients were using a peak flow meter at least weekly, whereas only 14·9% of patients reported doing so (Se=0·34). Given the low prevalence of these behaviours, the positive predictive values were lower than for medication use.

In addition, doctors identified 148 patient records with a recent FEV_1 or PEFR recording in the surgery (44%), whereas fewer patients (32%) recalled that their doctors 'always/sometimes' measured their lung function in the surgery; these doctor and patient measures were not identical so formal agreement was not assessed.

Health care utilization measures showed reasonable agreement between doctor and patient, except for recent visits to the GP, whom 50 of 140 patients thought they had visited in the past 3 months, when the GP had no record of this, leading to the modest specificity (0·64) and kappa (0·40) values.

Measures of agreement [kappa (κ) statistics] in Table 2 were compared across age categories, and by symptom frequency. No trends were noted for bronchodilator or preventive medication groups, but agreement about theophylline use was greater in the frequently symptomatic group ($\kappa=0·83$) than in the less frequent group ($\kappa=0·44$, $P<0·01$). Similar, but non-significant trends were noted for agreement with oral corticosteroid use by symptom frequency ($\kappa=0·58$, 0·72) and agreement increased with age category ($\kappa=0·37$, 0·65, 0·75). Agreement between doctor and patient was generally higher for more symptomatic patients, and those aged over 45 years,

especially regarding reported healthy care utilization. This difference was significant only for 'recent GP visits' for those aged over 45 years, where $\kappa=0{\cdot}50$, significantly higher than for younger patients (pooled $\kappa=0{\cdot}30$, $P<0{\cdot}01$).

Discussion

The results of this reflect the ongoing sub-optimal management of asthma in relation to recommended population guidelines, but demonstrates the potential for misclassification of estimates which rely on patient reports. This indicates that patient-reported asthma management may underestimate that provided by doctors in the population. The study comprised a representative sample of patients and practices, and included patients with asthma presenting to their practitioner for any reason, not necessarily for their asthma. Within this study, management and morbidity did not differ among regions, but the sample size was too small to examine inter-practitioner comparisons. Representativeness was also more likely as the present study estimated rates of diagnosed asthma and medication prescribing patterns similar to other Australian research (1,6).

This study confirmed previous observations that asthma is a condition predominantly managed in primary medical care (4,6,10). However, not all of these asthma patients attended for regular review, with 25% of the whole sample having had no review by a doctor within the past year, and almost 40% of those with frequent symptoms reporting having no medical attendance for asthma in the previous 3 months.

As with other GP-based studies (13,19), patients reported more frequent symptoms and greater levels of morbidity than in population-based studies due to the selection effect of those studied in this setting (1,21). Over one-third of patients reported asthma symptoms at least twice per week, suggesting at least moderate asthma. Morbidity was considerable, with one-half of the patients reporting some time off work or school due to their asthma, and one-sixth of patients reporting a hospital admission or A&E visit in the previous 12 months. The proportion reporting time off work or school was not related to asthma severity in this study, suggesting that a range of factors may influence absenteeism (20).

Studies in clinic settings have suggested that improving patient monitoring, and increased use of preventive medication may reduce the morbidity associated with chronic asthma (22,23). Sub-optimal asthma management against published recommendations (2) was evident in that fewer than one-half of the patients reported using any preventive medication, and only one-fifth owned a peak flow meter to assess the severity of their asthma. Patients with frequent symptoms are particularly at risk (2), and reported higher rates of medication use and morbidity. However, even within this group, one-third used no preventive medication, and only small proportions monitored their asthma or had written action plans. Further, only one-third of patients reported that their GP 'always or sometimes' measured their airway function in the surgery, which was a major recommendation of published asthma management guidelines (2,3).

One-sixth of the sample were current cigarette smokers, a recognized precipitant of asthma episodes in many patients (19). Unexpectedly, self-reported smoking was significantly more common in the more frequent symptom group. This has been previously reported in Australian adolescents with asthma (24), but the cognitive antecedents of smoking in asthma are not understood.

Doctors' actual management of asthma was less good than an earlier self-reported survey of general practitioners would suggest. A national sample of 500 GPs in 1990 reported that they used preventive medication in over 80% of their patients, and 79% of them measured airway function on 'most or some' visits by patients with asthma (25). The findings of the present survey suggest that doctors are doing better than patient surveys would suggest, but not as well as doctors' own reports of their practice.

The patients for whom matched data were available ($n=334$, with both GP and patient reports) were a more severe sub-sample of the 501 responders, on the basis of more frequent asthma symptoms, and more health care utilization than those 167 without comparable GP estimates. The matched analysis showed that patients' use of medication and self-management practices were considerably less good than doctors believed them to be. The criterion or standard used as the GPs' view, as they assessed management from reading the patient's medical record. As only patients who had attended the practice for asthma were included, it is likely that this method ascertained true prescriptions and recommended management advice.

The differences between patient and doctor reports may have occurred because doctors prescribed medication or recommended certain practices to patients, but these were not remembered or adhered to (26,27). From an epidemiological point of view, estimates from patient-based surveys may underestimate the true prevalence of doctors' asthma management practices, and paint an unnecessarily negative view of

the prescribing and counselling habits of doctors. Problems with compliance with recommended therapy and management advice are widely recognized (23), but their effect on patient-derived prevalence estimates needs to be considered in future research.

Positive predictive values were lower for the less prevalent practices, such as ownership of peak flow meters and action plans. This makes it more difficult for doctors to judge levels of these behaviours in their practice populations.

The results from the present study of medical practice attenders may represent a best-case scenario for asthma management, compared to general population samples (1,28) or studies of those who obtain bronchodilator medication exclusively over the counter from pharmacists (21,29). The GPs who participated did not differ substantially from those who declined, but may have been more motived with respect to asthma care. The patients were drawn from geographically and socio-economically diverse practices, but prevalence, management and morbidity did not differ among regions, as has been observed previously (1).

Conclusions

The present study provided data from a diverse group of people with moderately severe asthma. The observed differences between doctor and patient reports of management suggest that epidemiological studies should not rely exclusively on patient self-reports. In addition, patient and doctor perceptions differed enough to suggest that communication barriers may have contributed to reduced adherence with recommended advice. Strategies to inform GPs about the complexities of asthma management have been disseminated through the Australian National Asthma Campaign (25,30,31). Further education for GPs should emphasize the problems of patient understanding and adherence to recommended advice, and the need for medical review and reinforcement. Methods of teaching patients need to be improved, perhaps using ancillary practice nurses or health educators (11). Patients need to develop greater responsibilities in the collaborative management of their asthma, and need to maintain self-management behaviour beyond their interval episodes of acute asthma.

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